3

Dynamics of Reproductive Behavior and Population Change

> *People are the most important and valuable resources of any nation.*
> — Principle *2*

> *Population-related goals and policies are integral parts of cultural, economic and social development, the principal aim of which is to improve the quality of life of all people.*
> — Principle *5*

> Cairo Conference on Population and Development [24]

In Benin, Côte d'Ivoire, Mali, Niger, and Uganda, the typical woman who survives to age 50 will give birth to more than seven children; her life expectancy at birth ranges from a low of 46 years in Uganda to a high of 52 years in Côte d'Ivoire. In contrast, the average woman in the United States will bear just two children in a lifetime that will last about 79 years.[9]

Why should these statistics concern family planning practitioners? The principle of voluntary family planning demands that individuals have the right to achieve their reproductive life goals, whatever they may be, but individual reproductive behaviors also have aggregate consequences, because they influence the health and determine the fertility of a population.

It is only natural that those involved in family planning and reproductive health would want to understand how the use of contraception, the effectiveness of various contraceptive methods, the prevalence of abortion, and the duration of breastfeeding affect fertility in a population. Fertility, however, is only one cause of population change. This chapter also briefly considers the two other causes of population change: mortality and migration.

CAUSES OF MORTALITY

As living conditions in a country improve, the causes of death shift dramatically.[18] In developing countries, the major causes of death are infectious diseases. In developed countries, causes of death are concentrated among degenerative diseases such as cancer and cardiovascular disease. This shift occurs primarily because infant and child mortality are much higher in developing countries. Poor nutrition makes children more susceptible to infection and less able to withstand illnesses that otherwise would not prove fatal. Improvement in living conditions implies better nutrition, sanitation, water supply, and access to public health measures such as vaccination against tetanus, measles, and other common diseases. With such improvements, children survive to adulthood, when degenerative diseases become the primary causes of death.

Reproductive and sexual behavior affect mortality in three major ways:

- The number of children women bear, the ages at which they bear children, and the length of intervals between births all affect maternal and infant health.[16] Short intervals between births are associated with higher rates of infant, child, and maternal mortality. Reducing the number of children that women bear would reduce maternal morbidity and mortality. (See Chapter 1 on Benefits of Family Planning).

- Breastfeeding significantly lowers the risk of infant and child death.[26]

- Unprotected sexual intercourse increases the risk of sexually transmitted infections (STIs), including the human immunodeficiency virus (HIV). Pregnant women infected with HIV may transmit the infection to their infants during pregnancy or childbirth or through breast milk. By the year 2000, as many as 110 million adults worldwide will be infected with HIV. By the end of this century, 90% of all HIV infections will be in developing countries.[12] The impact on infant and child mortality rates and on population growth is devastating in certain areas of the world, particularly sub-Saharan Africa and Asia. (See Chapter 5 on HIV, AIDS, and Reproductive Health.)

DETERMINANTS OF FERTILITY

The estimated population of the world in mid-1995 was 5.702 billion, and the world population is currently growing 1.5% per year.[9] In 1995, approximately 86 million people—a number comparable to the populations of Mexico (94 million) and Germany (82 million), the eleventh and twelfth largest countries in the world—were added. At the current growth rate, the increase in population is substantial:

- 234 thousand more people every day
- 10 thousand more people every hour

Should this growth of 1.5% continue, the world's population will be 12.0 billion in 50 years, and it will be 25.3 billion in 100 years. Of course, such growth could not continue indefinitely. Indeed, the annual growth rate has fallen after peaking at 2.06% per year in the period of 1965 to 1970.[25] Table 3:1 shows the population size and rate of growth for various countries, including those in Africa.

Table 3:1 1995 World Population Data Sheet of the Population Reference Bureau, Inc.

	Population Estimate 1995 (millions)	Birth Rate (per 1,000 pop)	Death Rate (per 1,000 pop)	Natural Rate of Increase (annual %)	Population Doubling Time, Years (at current rate)	Population Projection, 2010 (millions)	Infant Mortality Rate (deaths per 1,000 live births)	TFR (average number of children born to each woman)	% Population Under Age 15	% Population Over Age 5	Life Expectancy at Birth (males)	Life Expectancy at Birth (females)	Urban Population (%)	% Married Women Using Contraception	% Married Women Using Modern Contraception
WORLD	5,702	24.4	8.9	1.55	44.7	7,024	61.6	3.1	32.1	6.3	63.8	67.7	42.9	57.8	49.4
More Developed	1,169	11.9	10.3	0.16	431.8	1,232	9.6	1.6	20.0	13.2	70.4	78.1	73.6	—	51.7
Less Developed	4,533	27.7	8.6	1.91	36.3	5,791	67.4	3.5	35.2	4.6	62.1	65.0	35.0	55.4	48.9
Less Developed (Excl. China)	3,314	31.3	9.4	2.20	31.5	4,406	72.3	4.0	38.2	4.0	60.4	63.0	37.5	41.2	32.6
AFRICA	720	41.3	13.0	2.84	24.4	1,069	89.8	5.8	44.6	3.2	53.3	56.4	30.8	21.5	17.1
Sub-saharan Africa	586	43.9	14.3	2.96	23.4	892	94.6	6.2	45.7	3.1	50.8	54.0	26.8	15.4	10.9
Northern Africa	162	31.9	7.8	2.41	28.8	219	62.9	4.4	40.8	3.5	62.6	65.2	44.6	39.3	35.4
Algeria	28.4	30.4	6.4	2.40	28.9	38.0	55.0	4.4	38.7	3.6	66.0	68.3	49.6	47.0	43.0
Egypt	61.9	30.3	7.8	2.25	30.8	80.7	61.5	3.9	39.7	3.6	62.4	64.8	44.0	47.1	44.8
Libya	5.2	41.9	8.1	3.38	20.5	8.9	68.0	6.4	47.6	3.0	61.6	65.0	85.4	—	—
Morocco	29.2	27.7	5.9	2.18	31.8	38.4	57.3	4.0	40.3	3.9	73.2	81.2	46.5	41.5	35.5
Sudan	28.1	41.4	11.6	2.98	23.3	41.5	76.9	5.9	46.2	2.2	54.0	56.0	26.5	8.7	5.5
Tunisia	8.9	25.3	6.2	1.91	36.3	11.2	43.0	3.4	36.6	4.9	66.9	68.7	60.0	49.8	40.4
Western Sahara	0.2	46.7	18.3	2.84	24.4	0.3	147.5	6.9	—	—	45.7	48.0	—	—	—
Western Africa	199	44.9	14.0	3.09	22.5	311	85.8	6.4	45.6	2.9	51.7	54.5	22.9	7.8	3.7
Benin	5.4	48.7	17.8	3.09	22.4	8.3	86.0	7.10	47.4	2.8	45.9	49.3	30.1	9.2	0.5
Burkina Faso	10.4	47.3	18.9	2.84	24.4	14.5	93.9	6.90	48.0	3.2	44.1	45.8	14.5	7.9	4.2
Cape Verde	0.4	36.2	8.6	2.76	25.1	0.6	50.0	4.26	45.2	5.8	63.5	65.5	44.1	—	—
Côte d'Ivoire	14.3	49.9	15.1	3.48	19.9	23.1	92.0	7.41	46.7	2.1	49.7	52.4	39.0	2.9	0.5
Gambia	1.1	48.0	21.0	2.70	25.7	1.5	90.0	5.90	44.6	2.4	43.4	46.6	26.0	11.8	7.0
Ghana	17.5	41.7	11.7	3.00	23.1	26.6	81.0	5.50	45.3	2.9	54.2	57.8	35.8	18.9	9.3
Guinea	6.5	43.7	19.4	2.43	28.5	9.3	143.0	5.81	44.3	2.7	42.1	46.7	28.8	—	—
Guinea-Bissau	1.1	42.7	21.3	2.14	32.4	1.5	140.0	5.79	43.3	3.1	41.9	45.1	21.7	—	—
Liberia	3.0	47.3	14.2	3.31	20.9	4.8	126.0	6.80	46.0	3.7	54.0	57.0	43.8	6.4	5.4
Mali	9.4	51.4	19.7	3.17	21.9	15.0	103.6	7.33	45.9	3.8	44.9	48.3	22.0	4.7	1.3
Mauritania	2.3	39.8	14.4	2.54	27.3	3.3	101.0	5.40	45.3	3.5	49.9	53.1	39.1	4.1	1.3
Niger	9.2	52.5	18.9	3.36	20.6	14.8	123.0	7.40	49.1	3.2	44.9	48.1	15.2	4.4	2.3
Nigeria	101.2	43.1	11.8	3.13	22.1	162.0	71.5	6.27	44.9	2.9	55.0	57.6	16.1	6.0	3.5
Senegal	8.3	43.0	16.0	2.70	25.7	12.2	68.0	6.03	44.6	2.9	48.3	50.3	38.5	7.4	4.8
Sierra Leone	4.5	46.0	19.0	2.70	25.7	6.4	143.0	6.20	44.2	3.0	44.3	47.1	35.4	—	—
Togo	4.4	46.5	10.9	3.56	19.5	7.4	85.5	6.86	48.7	2.2	55.5	59.8	30.3	33.9	3.0
st. helena	0.0	13.2	8.2	0.50	138.6	0.0	21.4	1.12	27.7	8.8	73.4	77.3	42.8	—	—
Eastern Africa	226	45.6	15.5	3.01	23.0	345	106.5	6.4	47.4	3.0	48.5	51.5	20.6	16.7	11.6
Burundi	6.4	46.0	15.7	3.03	22.9	9.5	102.0	6.60	46.4	3.9	48.4	51.9	6.3	8.7	1.2
Comoros	0.5	46.3	10.8	3.55	19.5	0.9	78.5	6.83	48.0	2.7	55.8	60.3	28.5	—	—
Djibouti	0.6	38.1	16.1	2.20	31.5	0.8	115.0	5.80	41.0	2.2	46.7	50.0	76.6	—	—
Eritrea	3.5	42.4	16.4	2.60	26.7	5.2	135.0	5.80	—	—	46.0	49.0	16.9	—	—
Ethiopia	56.0	46.3	15.6	3.07	22.6	90.0	119.8	7.04	49.3	3.4	48.4	51.9	14.7	4.3	2.6
Kenya	28.3	44.5	11.7	3.28	21.1	43.6	69.0	5.68	47.8	3.4	54.2	57.3	26.8	32.7	27.3
Madagascar	14.8	43.9	11.8	3.21	21.6	23.3	93.0	6.13	46.1	2.8	55.0	58.0	21.9	16.7	5.1
Malawi	9.7	47.4	20.1	2.73	25.4	14.7	134.0	6.73	48.3	2.5	44.2	45.4	16.5	13.0	7.4
Mauritius	1.1	21.1	6.5	1.46	47.5	1.3	18.5	2.35	29.6	5.5	65.0	73.0	43.9	74.7	48.9
Mozambique	17.4	45.2	18.5	2.67	26.0	26.9	148.0	6.50	46.0	2.4	44.9	48.0	32.8	—	—
Reunion	0.7	23.1	5.6	1.75	39.6	0.8	8.0	2.32	30.6	5.8	69.0	77.0	73.4	67.0	62.0
Rwanda	7.8	40.1	17.1	2.30	30.1	10.4	117.0	6.20	47.6	3.2	44.8	47.7	5.4	21.2	12.9
Seychelles	0.0	22.6	7.4	1.52	45.6	0.0	11.9	2.71	31.5	6.9	67.5	73.2	49.8	—	—
Somalia	9.3	50.2	18.5	3.17	21.9	14.5	122.0	7.00	47.5	2.7	45.4	48.6	23.5	—	—
Tanzania	28.5	45.0	14.9	3.01	23.0	42.8	91.6	6.25	46.7	2.5	47.0	50.0	20.8	20.4	13.1
Uganda	21.3	51.8	19.2	3.26	21.3	32.3	115.0	7.30	47.3	3.4	43.6	46.2	11.3	4.9	2.5
Zambia	9.1	47.3	16.7	3.06	22.7	13.0	107.2	6.50	49.6	2.4	46.9	48.6	42.0	15.2	8.9
Zimbabwe	11.3	39.1	12.0	2.71	25.6	15.3	52.8	4.40	44.1	2.8	52.4	55.1	26.7	48.1	42.2
mayotte	0.0	48.1	10.3	3.78	18.3	0.2	76.4	6.74	49.5	2.4	56.2	60.8	13.2	—	—
Middle Africa	83	45.5	16.4	2.92	23.8	127	107.5	6.3	45.8	3.0	47.0	50.8	33.5	—	—
Angola	11.5	47.2	20.2	2.70	25.7	17.6	137.0	6.38	44.9	3.0	44.0	48.0	37.0	—	—
Cameroon	13.5	40.4	11.1	2.93	23.7	21.2	65.0	5.91	44.2	3.4	55.6	59.8	41.2	16.1	4.3
Central African Republic	3.2	41.6	21.5	2.01	34.5	3.9	135.5	5.34	43.1	3.5	40.0	42.8	38.9	—	—
Chad	6.4	43.7	18.0	2.57	27.0	9.3	122.0	5.89	41.4	2.9	45.9	49.1	21.7	—	—
Congo	2.5	39.6	16.9	2.27	30.5	3.2	108.7	5.18	43.6	4.3	44.2	48.1	57.8	—	—
Equatorial Guinea	0.4	40.0	14.2	2.58	26.9	0.6	99.1	5.26	42.6	4.0	50.6	55.6	37.0	—	—
Gabon	1.3	37.3	15.5	2.18	31.8	1.9	94.0	3.95	39.2	5.8	51.9	55.2	73.2	—	—
Sao Tome and Principe	0.1	34.5	8.6	2.59	26.8	0.2	61.8	4.37	46.9	4.4	61.8	65.7	45.8	—	—
Zaire	44.1	47.9	16.4	3.15	22.0	69.1	107.6	6.64	47.8	2.7	45.8	49.6	28.8	7.9	2.5
Southern Africa	50	31.4	8.3	2.32	29.9	67	48.7	4.2	37.8	4.4	62.3	67.4	59.0	49.8	48.3
Botswana	1.5	30.7	7.3	2.34	29.6	2.2	38.7	4.15	43.3	3.3	60.3	66.4	26.5	33.0	31.7
Lesotho	2.1	31.2	11.8	1.94	35.7	3.0	79.0	5.20	40.7	4.4	58.0	63.0	22.3	23.0	19.0
Namibia	1.5	37.1	10.1	2.70	25.7	2.2	56.6	5.40	41.7	3.7	57.5	60.0	32.3	28.9	26.0
South Africa	43.5	31.0	8.0	2.30	30.1	57.5	46.0	4.11	37.1	4.5	63.0	68.0	63.4	53.0	51.7
Swaziland	1.0	42.9	10.7	3.22	21.5	1.6	89.6	6.07	45.9	2.4	53.0	61.2	30.2	19.9	17.2

(continued)

Table 3:1 1995 World Population Data Sheet of the Population Reference Bureau, Inc. (*Continued*)

	Population Estimate 1995 (millions)	Birth Rate (per 1,000 pop)	Death Rate (per 1,000 pop)	Natural Rate of Increase (annual %)	Population Doubling Time, Years (at current rate)	Population Projection, 2010 (millions)	Infant Mortality Rate (deaths per 1,000 live births)	TFR (average number of children born to each woman)	% Population Under Age 15	% Population Over Age 5	Life Expectancy at Birth (males)	Life Expectancy at Birth (females)	Urban Population (%)	% Married Women Using Contraception	% Married Women Using Modern Contraception
ASIA	3,451	24.4	7.9	1.65	42.0	4,242	62.1	2.9	32.7	5.1	63.9	66.5	32.5	61.8	54.8
Asia (excl. China)	2,232	28.1	8.7	1.94	35.7	2,857	68.4	3.5	35.8	4.6	62.3	64.4	34.9	44.9	34.9
Western Asia	168	31.1	7.0	2.41	28.8	242	50.7	4.3	38.8	4.2	65.3	69.3	58.2	—	—
Iraq	20.6	43.3	6.8	3.65	19.0	34.5	62.1	6.64	46.9	3.2	65.1	66.9	69.9	18.0	10.3
Saudi Arabia	18.5	36.1	4.1	3.20	21.7	30.0	24.0	5.50	42.6	2.3	68.9	72.3	78.8	—	—
Syria	14.7	41.1	5.8	3.53	19.6	23.6	39.0	5.90	49.2	4.4	64.9	67.4	50.9	—	—
Turkey	61.4	22.9	7.2	1.57	44.1	79.2	53.0	2.70	33.3	4.4	64.3	69.5	51.4	62.6	34.5
Yemen	13.2	50.1	14.3	3.58	19.4	21.9	109.0	7.70	51.8	3.0	51.7	52.9	25.1	9.7	6.1
South Central Asia	1,355	30.7	9.5	2.12	32.7	1,772	79.3	3.8	37.6	3.9	60.2	60.6	27.3	39.3	30.2
Bangladesh	119.2	35.5	11.7	2.38	29.1	160.8	108.0	4.26	41.5	3.0	55.5	55.0	17.0	44.6	36.2
India	930.6	28.5	9.2	1.93	35.9	1,182.7	74.0	3.40	36.0	4.1	60.3	60.4	25.7	40.6	36.6
Iran	61.3	35.5	7.0	2.85	24.3	83.7	55.6	5.04	44.3	3.5	65.6	68.0	57.0	65.0	45.0
Pakistan	129.7	39.0	10.0	2.90	23.9	187.7	91.0	5.60	41.0	3.0	60.8	60.6	32.0	11.9	9.0
Uzbekistan	22.7	31.4	6.5	2.49	27.8	31.9	37.4	3.80	40.8	4.2	66.1	72.4	40.6	—	19.0
Southeast Asia	485	26.5	7.8	1.87	37.0	601	53.0	3.2	36.8	4.0	62.2	66.2	30.5	50.7	43.6
Indonesia	198.4	24.1	7.8	1.63	42.5	240.6	64.2	2.81	36.5	3.9	61.2	64.9	30.9	49.7	47.1
Myanmar	44.8	28.3	8.9	1.94	35.7	57.3	47.5	3.61	36.0	4.0	57.9	63.1	25.0	—	—
Philippines	68.4	29.7	8.7	2.10	33.0	87.2	49.1	4.08	39.6	3.4	62.8	66.4	48.8	40.0	24.9
Thailand	60.2	20.2	5.9	1.43	48.5	68.7	34.5	2.20	31.3	4.1	68.0	72.0	18.7	65.5	63.6
Viet Nam	75.0	30.0	7.1	2.30	30.2	92.5	42.0	3.73	39.0	4.7	62.9	67.3	20.6	49.4	37.0
East Asia	1,442	17.0	6.5	1.05	66.1	1,628	40.1	1.8	26.1	6.8	67.8	71.8	35.2	86.8	84.0
China	1,218.8	17.7	6.5	1.12	61.8	1,385.5	44.0	1.86	27.2	6.2	66.8	70.4	28.1	89.7	88.7
Japan	125.2	9.6	7.1	0.25	277.3	130.4	4.3	1.46	16.4	14.0	76.3	82.5	77.4	64.0	47.0
Korea, North	23.5	23.0	5.5	1.75	39.6	28.5	26.4	2.36	29.6	4.1	67.1	73.4	60.9	—	—
Korea, South	44.9	15.4	5.8	0.96	72.2	49.7	11.0	1.63	24.4	5.4	67.7	75.7	74.4	79.4	69.0
Taiwan	21.2	15.6	5.3	1.03	67.4	24.0	5.6	1.76	25.1	7.1	71.8	77.2	74.5	75.0	68.0
NORTH AMERICA	293	15.2	8.6	0.66	104.7	334	7.9	2.0	21.9	12.6	72.3	79.1	75.4	70.9	65.8
Canada	29.6	13.8	7.0	0.68	101.9	33.6	7.0	1.67	20.9	11.8	74.4	81.0	77.0	73.1	69.0
United States	263.2	15.4	8.8	0.66	105.0	300.4	8.0	2.00	22.0	12.7	72.1	78.9	75.2	70.6	65.4
LATIN AMERICA	481	25.9	6.7	1.92	36.0	601	43.6	3.1	34.1	5.1	66.3	71.6	70.2	61.5	50.9
Central America	126	28.8	5.5	2.34	29.7	163	36.6	3.5	37.4	4.0	68.4	74.2	64.9	59.7	51.4
Guatemala	10.6	38.6	7.7	3.09	22.4	15.8	48.0	5.36	45.4	3.2	62.4	67.3	38.4	23.2	19.1
Mexico	93.7	27.1	5.1	2.20	33.9	117.7	33.7	3.10	35.5	4.2	69.5	75.5	71.3	65.0	56.0
Caribbean	36	22.7	7.6	1.51	45.9	43	38.7	2.9	30.6	6.8	67.2	72.4	59.9	—	—
Cuba	11.2	14.0	7.2	0.68	101.9	12.3	9.4	1.82	22.4	9.2	72.1	77.9	74.0	—	—
South America	319	25.1	7.1	1.81	38.4	395	47.2	3.0	33.2	5.4	65.4	70.5	73.5	63.8	51.4
Argentina	34.6	20.5	7.9	1.26	55.0	40.8	23.6	2.82	29.9	9.1	68.1	74.9	87.2	—	—
Brazil	157.8	24.6	7.5	1.71	40.5	194.4	58.0	2.88	32.3	5.2	64.0	68.7	76.6	65.8	56.0
Colombia	37.7	24.0	6.0	1.80	38.5	46.1	37.0	2.67	32.9	4.5	66.4	72.3	49.6	66.1	54.7
Peru	24.0	28.5	7.4	2.11	32.9	30.3	60.0	3.54	36.4	3.9	64.1	67.9	70.4	59.0	32.8
Venezuela	21.8	30.4	4.5	2.59	26.8	28.7	20.2	3.60	37.7	3.8	68.9	74.7	84.1	—	—
EUROPE	729	10.9	11.7	-0.07	-928.2	743	11.5	1.5	19.8	13.4	68.5	76.9	71.8	—	44.9
Northern Europe	94	12.9	11.4	0.16	442.5	97	6.9	1.8	19.6	15.3	72.8	78.9	84.7	73.3	65.8
United Kingdom	58.6	13.1	11.3	0.18	385.1	61.0	6.6	1.82	19.4	15.7	73.6	79.1	91.5	72.0	71.0
Western Europe	181	11.0	10.1	0.09	741.4	187	6.0	1.5	17.9	14.7	73.3	80.3	80.6	76.9	69.3
Belgium	10.2	11.8	10.6	0.12	577.6	10.4	7.6	1.61	18.2	15.6	73.1	79.8	96.6	79.0	75.0
France	58.1	12.2	9.0	0.32	216.6	61.7	6.1	1.65	19.9	14.5	73.6	81.8	74.0	81.0	66.0
Germany	81.7	9.5	11.0	-0.15	-465.2	81.2	5.8	1.30	16.4	15.0	72.9	79.3	85.3	75.0	72.0
Netherlands	15.5	12.8	9.0	0.38	182.4	16.9	5.9	1.57	18.4	13.1	74.0	80.0	89.0	76.0	72.0
Eastern Europe	310	10.5	13.9	-0.34	-203.8	315	16.9	1.5	21.8	11.7	62.5	73.3	68.2	—	22.4
Czech Republic	10.4	11.7	11.4	0.03	2310.5	10.5	8.5	1.67	21.1	10.0	68.9	76.6	75.3	68.9	44.9
Poland	38.6	12.4	10.1	0.23	301.4	40.2	13.7	1.79	23.7	10.7	67.4	76.0	61.8	—	—
Romania	22.7	11.0	11.6	-0.06	-1155.2	22.2	23.3	1.44	21.7	11.4	66.1	73.2	54.5	57.3	14.5
Russia	147.5	9.4	15.6	-0.62	-111.8	149.5	19.0	1.39	21.8	11.5	58.9	71.9	73.0	—	22.0
Ukraine	52.0	10.7	14.2	-0.35	-198.0	53.0	14.9	1.60	20.8	13.3	64.0	74.0	67.9	—	15.0
Southern Europe	144	10.6	9.2	0.13	515.8	144	10.7	1.4	18.0	13.9	72.5	79.2	60.3	—	—
Greece	10.5	9.8	9.4	0.04	1732.9	10.2	8.3	1.35	18.7	14.0	74.6	79.8	62.6	—	—
Italy	57.7	9.4	9.5	-0.00	-6931.5	56.5	7.4	1.21	15.5	15.5	73.6	80.3	67.9	—	—
Spain	39.1	9.9	8.7	0.12	577.6	39.0	7.6	1.24	17.4	14.6	73.4	80.5	64.1	59.4	38.0
Yugoslavia	10.8	13.4	10.0	0.34	203.9	11.1	18.4	2.05	23.1	10.1	69.0	74.6	46.8	—	—
OCEANIA	28	19.1	7.5	1.16	59.6	34	24.2	2.5	26.2	9.8	71.3	76.4	70.6	65.2	—
Australia	18.0	14.6	7.0	0.76	91.2	20.8	6.1	1.85	21.6	11.8	75.0	80.9	85.4	76.0	72.0

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Why is fertility high in some populations and low in others?

Childbearing ages have biological limits. Between menarche and menopause, a woman has about 35 years in which she can produce children. These limits constrain fertility, and they vary somewhat among populations. Childbearing spans can range from about 32 to 39 years.[7] For several reasons, however, the fertility impact of this difference of 7 years is likely to be small, at most a difference of one child over a lifetime, and possibly much less.[8]

Different populations vary in the proportion of females at each age who are sexually active and therefore exposed to the risk of pregnancy. In many populations, sexual intercourse is confined primarily to marriage. Thus, age at marriage, the proportion of women ever marrying, and patterns of divorce and remarriage are powerful causes of fertility levels. Increasing women's age at marriage lowers total fertility by removing younger women from the risk of childbearing and raising the age at which women bear children, thereby lowering the annual population growth rate by lengthening the time between generations.[23] Raising the age at marriage has other effects as well. The most important is to enhance the status of women, allowing them to stay in school longer to acquire job-related skills, to work outside the home before marriage, and to enter marriage with more physical and emotional maturity and financial security. Such social changes are themselves likely to stimulate a demand for fertility control.[10] Because raising the age at marriage so profoundly alters the social fabric, governments may be unwilling or unable to use this potential instrument of public policy.

Both the spacing between the initiation of sexual activity and the first live birth and the spacing between one live birth and the next vary across populations. The shorter the average interval between births, the greater the number of births that can be squeezed into the childbearing span.

The birth interval can be divided into three parts: the period of postpartum non-susceptibility following a birth during which a woman is not at risk of conception, the waiting time to a conception leading to the next live birth once she returns to risk; and the gestation

period itself.[14] The last part, the pregnancy period, does not vary from population to population. The other two parts vary considerably.

EFFECT OF BREASTFEEDING AND CONTRACEPTION

Consider a typical developing country in which contraceptive use is low but prolonged breastfeeding is nearly universal. Postpartum non-susceptibility lasts an average of 12 months. When not using contraception or breastfeeding, young wives typically take about 6 months to become pregnant (also called waiting time to conception). Pregnancy lasts 9 months. In such cases, the interval between one birth and the next is 12 + 6 + 9 = 27 months, or 2.25 years. The average fertility rate per year is therefore 1/2.25, or 444 births per 1,000 sexually active women.

A common effect of modernization is a decrease in breastfeeding but an increase in use of contraception. However, the decrease in breastfeeding often occurs before the increase in the use of contraception.

What if breastfeeding were completely abandoned in our typical population? The period of postpartum non-susceptibility would decrease to only 2 months. In this case, the typical interval between births would also decrease to 2 + 6 + 9 = 17 months, or 1.42 years. The average fertility rate among sexually active women would rise to 706 births per 1,000 sexually active women, a rate 59% greater than the 444/1,000 among breastfeeding women. Obviously, breastfeeding has an important contraceptive effect in a population, even though no individual woman may dependably rely on it to prevent pregnancy for very long. (See Chapter 12 on Lactation and Postpartum Contraception.)

As the use of contraception increases, the interval between births lengthens. If all women used contraception that reduces the monthly risk of pregnancy by 80%, the waiting time to conception would rise to 30 months. This rise would more than make up for the decrease in postpartum non-susceptibility. The interval between births would be 2 + 30 + 9 = 41 months, and the fertility rate would fall from 706 to 293 births per 1,000 sexually active women.

EFFECT OF ABORTION

Many people assume that one abortion will prevent one birth, but we can easily demonstrate that this statement is false. Return to our developing country with a birth interval of 27 months among young women (a period of postpartum non-susceptibility of 12 months, 6 months to get pregnant, and a pregnancy of 9 months). Imagine that every other pregnancy is aborted. In that case, the waiting time to conception would consist of the following: 6 months to get pregnant the first time, 3 months of pregnancy until the abortion, 1 month of postpartum non-susceptibility following the abortion, and 6 more months of waiting until the next pregnancy. The total waiting time to conception would be 16 months. Compare this waiting time with the regular waiting time to conception among young wives, which is only 6 months. Thus the waiting time to conception is 167% longer for someone who aborts a pregnancy than for someone who does not abort.

However, the birth interval for someone who aborts (12 + 16 + 9 months) increases by only 37%, from 27 to 37 months. Therefore, if every other pregnancy is aborted, the fertility rate would decrease by only 27%, not by 50% as one might initially expect. The reader may object that an abortion certainly prevents one birth. However, this way of thinking ignores the fact that the next birth occurs sooner when a pregnancy is aborted than when it results in a live birth. In summary, while an abortion prevents a particular birth, it reduces the woman's lifetime births by less than one if her reproductive behavior does not otherwise change.

EFFECT OF STIS

STIs have major effects on fertility in selected populations.[20] Syphilis is an important cause of fetal loss among women and causes primary or secondary infections; it also may contribute to low fertility among certain tribal groups in Burkina Faso and the Central African Republic.[7] Untreated pelvic inflammatory disease (PID) is a major cause of sterility. The low fertility rate characteristic of Central Africa

(a belt extending from the west coast of Cameroon and Gabon through northern Zaire into southwest Sudan) is thought to be associated with a high prevalence of gonorrhea.[1]

EFFECT OF NUTRITION

When food supplies are so short that there is famine and starvation, fecundity, and hence, fertility are reduced. But when malnourishment is chronic and food intake is above starvation levels, there does not appear to be an important link between nutrition and fertility.[15]

MIGRATION

Migration is linked to economic, social, and political conditions. When assessing the determinants of migration, investigators have traditionally emphasized "push" and "pull" factors. Push factors include extraordinary events such as wars, floods, famines, and political/religious persecutions as well as more ordinary circumstances associated with depressed economic settings: high unemployment, low wages, and little hope.

Pull factors attract people to a location. They often are associated with economic opportunity: good jobs, high wages, and good public services such as education and health care. They also may include an attractive environment, religious freedom, and proximity to family or members of one's own ethnic group.

FERTILITY TRANSITION

The historical record suggests a relationship, although a loose one, between socioeconomic modernization and fertility decline. But history also shows an important diffusion aspect to the practice of fertility control.[5,11] Allowing couples to decide the number of children they want to have and providing information and technical assistance to give meaning to this right, particularly when coupled with advances in

the status of women, could sharply reduce fertility.[4,19] Many women in developing countries desire increased spacing between children or termination of childbearing, according to considerable evidence from surveys.[27]

Voluntary family planning can play an important role in aiding a nation's development.[13,17,28] Although slower population growth would benefit development in most developing countries, it would not automatically make poor countries rich. However, involuntary family planning might well undermine development.

Experience in China illustrates an alternative to voluntary family planning that is clearly effective in reducing fertility and the rate of population growth. However, it is unlikely that many other governments would have the authority to enforce China's compulsory policies. Recent experience with mass sterilizations in India suggests that coercive or compulsory policies to bring down the birth rate are more likely to bring down the government instead.

Government attempts to lower fertility too quickly can bring unintended consequences. From 1979 through 1983, the government of China vigorously promoted the policy of one child per family. What would be the consequences if the one-child policy were strictly adopted? By the year 2035, about 25% of the population would be aged 65 and over, versus only about 5% today.[6] The traditional family structure would change radically in ways that would jeopardize the family's ability to care for the elderly and reduce its potential as a production unit; there would be no brothers, sisters, aunts, or uncles. The one-child policy may have already had the unintended side effect of causing female infanticide, due to a cultural preference for sons.[2,3,29]

Finally, attempts to increase fertility can create great problems. In 1966, the government of Romania introduced pronatalist policies, including a decree banning virtually all abortions; in addition, importation of oral contraceptives and intrauterine devices (IUDs) was discontinued. The result was as instantaneous as it was stunning.[21,22] Within 8 months the monthly birth rate had doubled; within 11 months it had tripled. Inadequate hospital care for the babies and their mothers caused infant and maternal mortality to rise sharply. As a consequence of unsafe illegal abortions, maternal mortality increased

to a level 10 times that in any other European country. In the 23 years the policy was enforced, more than 10,000 women died from unsafe abortions. Many women who did not resort to unsafe abortions bore unwanted children whom they placed in institutions. Such large-scale warehousing of children overwhelmed these institutions and severely degraded the quality of care. The educational system had to absorb a huge increase in students. Other problems, such as employment and housing, also arose. The government action certainly had the result of increasing fertility, but obviously the government had not thought clearly about the consequences. The policy was reversed immediately after the Ceaucescu regime was overthrown in December 1989.

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